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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/936,354	09/11/2001	Gerhard Olbert	49845	3616

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EXAMINER	
MCHENRY, KEVIN L	
ART UNIT	**PAPER NUMBER**
1725	

DATE MAILED: 12/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/936,354	OLBERT ET AL.	
	Examiner	Art Unit	
	Kevin L. McHenry	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 October 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-21* is/are pending in the application.

4a) Of the above claim(s) *20 and 21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Rejections - 35 USC § 112

1. Claims 12-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

2. Claim 12 uses the language "...optionally redirected to assume a meandering path..." in lines 6-7 of claim 12. This language is indefinite because it renders the scope of the claim indefinite; it is unclear if the redirection is included in the scope of the claim or not. For examination purposes the examiner interpreted claim 12 to not include this language.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 12 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Ruppel et al. (U.S.P. 5,821,390).

Ruppel et al. teach a multitube reactor with a catalyst tube bundle arranged within an outer wall. The tube bundle includes 5000 to more than 40,000 tubes. The reactor has means for introducing and discharging a heat transfer medium that flows around the catalyst tubes radially or transversely around the tubes. The tubes have a length of 2-4 m. Ruppel et al. teach that the ratio of tube spacing to the external

diameter of the catalyst tubes is 1.1-2.1. The reactor is also divided in the longitudinal direction of the tubes into several zones so that heat transfer medium will have different temperatures in the different zones due to the transfer of heat (see U.S.P. 5,821,390; particularly Figure; column 2, lines 3-19; column 6, lines 3-12).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruppel et al. (U.S.P. 5,821,390) as applied to claims 12 and 19 above, and further in view of Westerman et al. (U.S.P. 4,894,205).

Ruppel et al. teach the reactor taught above in section 7. However, Ruppel et al. do not teach that the tube ratio changes with tube bundle diameter or a tube bundle diameter.

Westerman et al. teach a multitube reactor. Westerman et al. teach that the reactor will have a diameter of about 5 m while reactors with 5000 tubes have tube diameters of about 45 mm and reactors with 15,000 tubes have tubes with a diameter of about 25 mm. Therefore, Westerman et al. teach that the ratio of tube spacing to tube diameter increases with increasing bundle diameter for a given tube spacing (see U.S.P. 4,894,205; particularly column 1, lines 52-56).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the reactor of Ruppel et al. by the teachings of Westerman et al. One would have been motivated provide a proper tube bundle diameter for a multitube reactor, as taught by Westerman et al., and to provide the proper tube diameter for a given number of tubes, as taught by Westerman et al. One of ordinary skill would have been further motivated to follow these teachings to provide a reactor design that would have suitable heat transfer properties due to its bundle size and configuration.

7. Claims 12, 17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Groten et al. (U.S.P. 5,730,843) in view of Ruppel et al. (U.S.P. 5,821,390).

Groten et al. teach a rectangular multitube reactor (see U.S.P. 5,730,843; particularly Figure 2; column 5, lines 39-47).

Groten et al. do not teach ratios of catalyst tube spacings to their diameters.

Ruppel et al. teach a multitube reactor with a catalyst tube bundle arranged within an outer wall. The tube bundle includes 5000 to more than 40,000 tubes. The reactor has means for introducing and discharging a heat transfer medium that flows around the catalyst tubes. The tubes have a length of 2-4 m. Ruppel et al. teach that the ratio of tube spacing to the external diameter of the catalyst tubes is 1.1-2.1. The reactor is also divided in the longitudinal direction of the tubes into several zones so that heat transfer medium will have different temperatures in the different zones due to the transfer of heat. Ruppel et al. teach that this reactor design is beneficial for production of acrolein in a simple manner with reduced formation of hot spots (see U.S.P.

5,821,390; particularly Figure; column 2, lines 3-19; column 3, lines 50-63; column 6, lines 3-12).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the reactor of Groten et al. by the teachings of Ruppel et al. One would have been motivated to do so in order to provide a reactor design that was beneficial for production of acrolein in a simple manner with reduced formation of hot spots, as taught by Ruppel et al.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Response to Arguments

9. Applicant's arguments filed 4 October 2004 have been fully considered but they are not persuasive.

The applicant argues that Ruppel et al. is silent as to the use of ratios between tube spacing and external diameter. The applicant argues that the values cited by the examiner are merely obvious and are determined from arbitrary values since Ruppel et al. does not teach examples that teach or cover the cited range of ratios.

The applicant's argument is unpersuasive because the values determined from the teachings of Ruppel et al. are not obvious extrapolations but inherent properties of the reactors taught by the reference. Ruppel et al. teach values for tube internal diameter, tube thickness, and tube spacing. Therefore, Ruppel et al. teach reactors with tubes of different external diameters and spacings. Because of the physical nature of the arrangement of the tubes in a bundle, as taught by Ruppel et al., the tubes will have a ratio of tube spacing to external diameter. This ratio is a mathematical formula that is merely an expression of physical properties that exist naturally due to the spacing and size of the tubes. That is, once values for tube spacing and external diameter (or internal diameter and thickness in this case) are taught for a reactor, a ratio of tube spacing to external diameter exists physically in the reactor.

The values used to determine the ratios taught by Ruppel et al. are not arbitrary because the values used were the end points of tube internal diameter (20-30 mm), tube thickness (1-3 mm), and tube spacing (35-45 mm). (See column 2, lines 3-18). In fact, in the case of a tube thickness of 1 mm, the ratio range is 1.1-2.1. Therefore, the ratios inherent in the teachings of tube internal diameter, tube thickness, and tube spacing read upon the applicant's claim.

The applicant argues that one of ordinary skill would construct a reactor for maximum throughput or cost. These argument is unpersuasive because they do not

overcome Ruppel et al.'s inherent ratios. Also, one of ordinary skill in the art would not consider output and costs as their only factors, but would also consider optimum operating conditions to produce quality products.

The applicant also argues that the ratio taught by the applicant allows the use of higher heat transfer mediums. High heat transfer mediums in combination with tube ratios are note cited by the applicant.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin L. McHenry whose telephone number is (571) 272-1181. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin McHenry

KILEY S. STONER
PRIMARY EXAMINER
12/6/04